Wine & Windowing
An Impedance Mismatch

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Disclaimer

Expect:
- cursed stuff
- very cursed stuff
- extremely cursed stuff
The Layering

Win32
38 years of backwards compatible cruft

X11
39 years of backwards compatible cruft
winex11.drv
winex11.drv
Let’s Talk About Nasty Behavior
Let’s Talk About Modesetting
(that’s a video showing modeset in non-PDF version)
Fullscreen Hack
• never modeset
• image scaling
• letter- / pillar- boxing
• vulkan shader for scaling
<table>
<thead>
<tr>
<th>File</th>
<th>Lines</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>dlls/winex11.drv/Makefile.in</td>
<td>1</td>
<td>+</td>
</tr>
<tr>
<td>dlls/winex11.drv/desktop.c</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td>dlls/winex11.drv/display.c</td>
<td>42</td>
<td>-</td>
</tr>
<tr>
<td>dlls/winex11.drv/event.c</td>
<td>18</td>
<td>-</td>
</tr>
<tr>
<td>dlls/winex11.drv/fs.c</td>
<td>971</td>
<td>++++++++</td>
</tr>
<tr>
<td>dlls/winex11.drv/graphics.c</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>dlls/winex11.drv/init.c</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td>dlls/winex11.drv/mouse.c</td>
<td>46</td>
<td>-</td>
</tr>
<tr>
<td>dlls/winex11.drv/opengl.c</td>
<td>1272</td>
<td>++++++++</td>
</tr>
<tr>
<td>dlls/winex11.drv/vulkan.c</td>
<td>135</td>
<td>++++</td>
</tr>
<tr>
<td>dlls/winex11.drv/window.c</td>
<td>242</td>
<td>++++-</td>
</tr>
<tr>
<td>dlls/winex11.drv/x11drv.h</td>
<td>48</td>
<td>++</td>
</tr>
<tr>
<td>dlls/winex11.drv/x11drv_main.c</td>
<td>11</td>
<td>-</td>
</tr>
<tr>
<td>dlls/winex11.drv/xrender.c</td>
<td>136</td>
<td>+++-</td>
</tr>
<tr>
<td>dlls/winex11.drv/xvidmode.c</td>
<td>22</td>
<td>-</td>
</tr>
</tbody>
</table>

15 files changed, **2882 insertions(+)**, 77 deletions(-)
dlls/winevulkan/loader.c | 54 +-  
dlls/winevulkan/make_vulkan | 16 +-  
dlls/winevulkan/vulkan.c | 1007 +++++++++++++++++++++++++++++++++++++  
dlls/winevulkan/vulkan_loader.h | 24 +  
dlls/winevulkan/vulkan_private.h | 43 ++  
5 files changed, **1126 insertions(+)**, 18 deletions(-)
• not (that) necessary with XWayland
• X11 is still everywhere
• downstream, specific to Proton
Let’s Talk About Inconsistency
Let’s Talk About XWayland
Pixmap *pixmap = XCreatePixmap(display, window, 20, 20, 24);

GLXContext *gl_context = glXCreateContext(display, visual_info, NULL, GL_TRUE);

glxMakeCurrent(display, window, gl_context);

GC *gc = XCreateGC(display, window, 0, NULL);
GlColor3b(100, 0, 0); /* red */

glBegin(GL_QUADS);
glVertex2f(-1.0f, 1.0f);
glVertex2f(1.0f, 1.0f);
glVertex2f(1.0f, -1.0f);
glVertex2f(-1.0f, -1.0f);
glEnd();
glXSwapBuffers(display, window);
XCopyArea(display, window, pixmap, gc, 0, 0, 20, 20, 0, 0);
XCopyArea(display, pixmap, window, gc, 0, 0, 20, 20, 0, 0);
XCopyArea(display, window, pixmap, gc, 0, 0, 20, 20, 0, 0);
XCopyArea(display, pixmap, window, gc, 0, 0, 20, 20, 0, 0);
Horrible Flicker

QtWebEngine
OpenGL rendering

BitBlit() 2x2 square every 1s translated to XCopyArea()

workaround
LIBGL_ALWAYS_SOFTWARE=1

reported against gamescope
Let’s Talk About Fragmentation
Let’s Talk About WMFs
Window Manager Specification Project

The Window Manager Specification is meant to unify the GNOME and KDE window manager hint conventions. Most of the design work takes place on \texttt{wm-spec-list@gnome.org}; you can subscribe to this list at \url{http://mail.gnome.org/mailman/listinfo/wm-spec-list}. To post without subscribing, subscribe to the no-traffic \texttt{post-only@gnome.org} list.

Mailinglist

You can find archives of the WM spec list \url{here}.

Repository

\texttt{wm-spec} is included with other \texttt{freedesktop.org Specifications} in the \texttt{xgd-specs} \texttt{git} repo.

- \texttt{wm-spec} history:
  - \url{http://cgit.freedesktop.org/xdg/xdg-specs/log/wm-spec/}
- \texttt{Browse xdg-specs} repo:
  - \url{http://cgit.freedesktop.org/xdg/xdg-specs/}
- \texttt{Clone}:
  - \texttt{git://anongit.freedesktop.org/xdg/xdg-specs}
  - \texttt{ssh://git.freedesktop.org/git/xdg/xdg-specs}
  - \url{http://anongit.freedesktop.org/git/xdg/xdg-specs.git}

Spec

- Version 1.3 - \texttt{html (one page)} - \texttt{html (multiple pages)} - \texttt{xml}
- Version 1.4.draft-2 - \texttt{html (one page)} - \texttt{html (multiple pages)} - \texttt{xml}
2022-October Archive by Thread

- Messages sorted by: [ Thread ] [ Date ] [ Author ]
- Other months

Messages are ordered newest-to-oldest in this index. The newest threads will be at the top of this page, the oldest will be at the bottom.

Within a single thread, the first mail note is the START of the thread; the notes following that are in the chronological order of when they were received. So globally, newest messages are at the top, but within a thread, the oldest (the start of the thread) is at the top.

If you think about it, it is confusing. Just go with the flow and everything will be all right.

- Announcement: this mailing list will be retired by the end of Oct 2022, Andrea Veri
date -> pubdate, so it appears in the HTML-generated pages

David Faure authored 9 years ago
• wm-spec
  ○ version 1.5 (one page, split pages)
  ○ version 1.4
  ○ version 1.3
  ○ version 1.2
  ○ version 1.1

• xembed-spec
  ○ version 0.5 (one page, split pages)

• xsettings-spec
wm-spec: update / redirect FDO wiki

Issue created 55 minutes ago by Arkadiusz Hiler

https://www.freedesktop.org/wiki/Specifications/wm-spec/ is the first result that comes up when using DuckDuckGo, Mojee and Google. It’s outdated and misleading in many ways:

1. creates illusion that a draft of 1.4 is the latest version
2. mentions a defunct way of contributing (https://mail.gnome.org/archives/wm-spec-list/2022-October/msg00000.html)
3. link to the cgit repos instead of here
4. most links in supporter sections go to pages that are no longer there
5. claims to be Last edited Fri May 7 01:22:37 2021 which would suggest that it’s still fairly up to date

It’s not clear if wm-spec is considered a done deal of if there’s still a way of contributing / rising issues about unclear spec.
Let’s Talk About Mutter
This hint might [...] be used by a movie or presentation application allowing users to display the media spanned over several monitors.

A read-only list of 4 monitor indices indicating the top, bottom, left, and right edges of the window when the fullscreen state is enabled. The indices are from the set returned by the Xinerama extension.
● It can’t be unset

● Imposes constraints, e.g. window can't be moved to another monitor by using the Shift+Super+Arrows
Let’s Talk About KWin
static HWND sync_window_position( struct x11drv_win_data *data,
    UINT swp_flags,
    const RECT *old_window_rect,
    const RECT *old_whole_rect,
    const RECT *old_client_rect )
{
    /* ... */
    /* KWin doesn't allow moving a window with
     * _NET_WM_STATE_FULLSCREEN set. So we need
     * to remove _NET_WM_STATE_FULLSCREEN before
     * moving the window and restore it later */
    if (wm_is_kde( data->display )
        && NtUserIsWindowRectFullScreen( &data->whole_rect ))
        /* ... */
}
Let’s Talk About Mutter
static void map_window( HWND hwnd, DWORD new_style )
{
  /*...*/
  update_net_wm_states( data );
  sync_window_style( data );
  XMapWindow( data->display, data->whole_window );

  /* Mutter always unminimizes windows when handling map requests. 
     Restore iconic state */
  if (new_style & WS_MINIMIZE)
    XIconifyWindow( data->display, 
                    data->whole_window, 
                    data->vis.screen );
  /*...*/
}
Let’s Talk About Nasty Games
Let’s Talk About Focus Stealing Prevention
A Game

- started **unfocused** on some WM
- with **taskbar visible** and the game being behind it
- after manual focusing (mouse click) **controller handling** was borken
HWND hWnd = CreateWindowExW(WS_EX_APPWINDOW | WS_EX_WINDOWEDGE,
  L"Nomad", L"Dunia", WS_POPUP,
  0,0, 1,1, NULL, NULL, hInstance, NULL);

ShowCursor(TRUE);
ShowWindow(hWnd, SW_NORMAL);
ShowWindow(hWnd, SW_MINIMIZE);

Sleep(2000); /* game init */
ShowWindow(hWnd, SW_RESTORE);

Sleep(2000); /* more stuff happening */
SetWindowPos(hWnd, NULL, 0, 0, 1920, 1080,
               SWP_NOOWNERZORDER | SWP_DRAWFRAME | SWP_NOZORDER);

Sleep(2000); /* even more things */
SetForegroundWindow(hWnd);
“This cosmic dance of bursting decadence and withheld permissions twists all our arms collectively, but if sweetness can win, and it can, then I'll still be here tomorrow to high-five you yesterday, my friend. Peace.”

- Royal Tart Toter, Adventure Time
Yeah, nah...
If I was WM I would also find this suspicious...
Partial fix to make sure the focus state is represented correctly on Win32 side and move on...
Let’s talk about Gamescope
Gamescope

• Designed for games.

• XWayland.

• We expose GWL_STYLE and GWL_EXSTYLE as window properties and gamescope understands those.

• Used to make better, informed decisions which window to focus / put in the foreground.

• Used for handling transparent / layered Windows.
Summary

- Any change to winex11.drv can cause a **butterfly effect**.
- We use X11 in ways that are **underdefined**.
- **Impossible to get things exactly right** without more extensions / WM's involvement.
Thanks!
Questions?